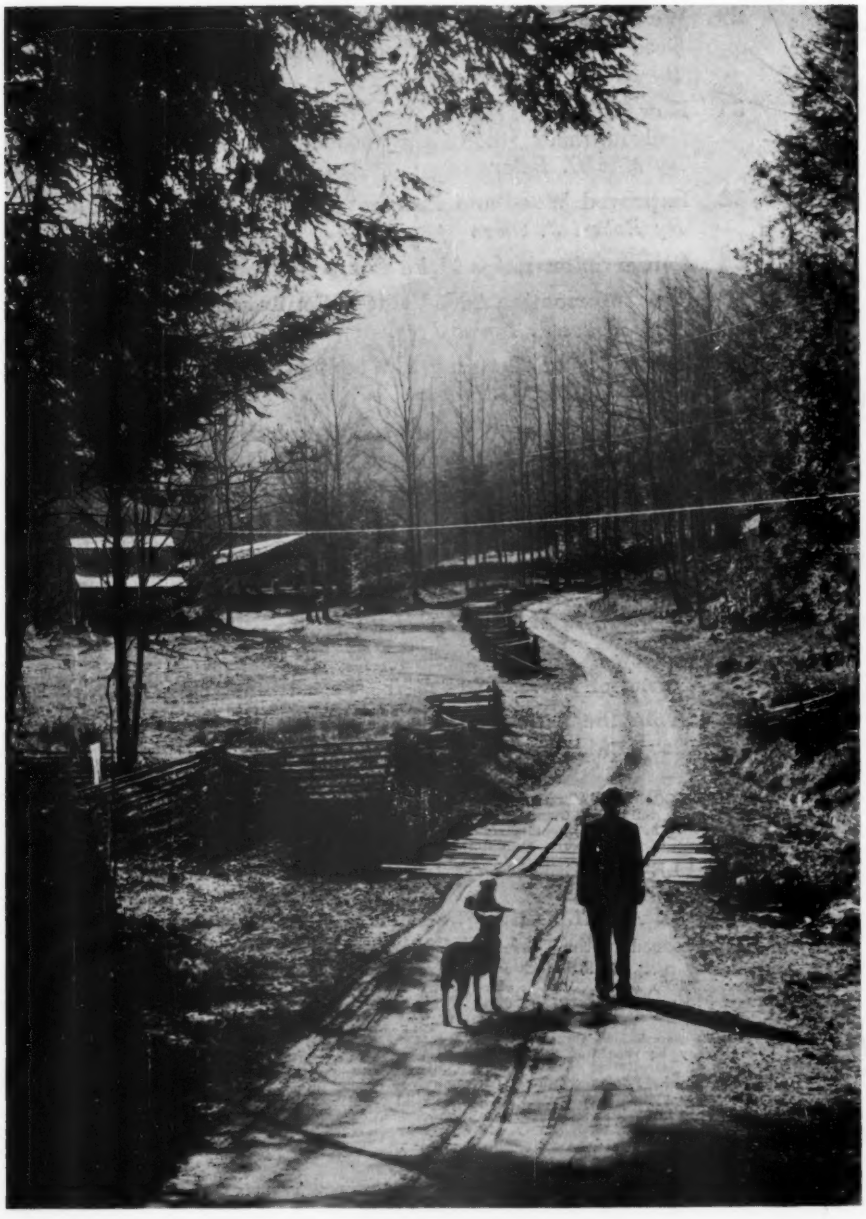
SEPTEMBER 1966
VOL. 32 NO. 2

Soil Conservation

DEVOTED TO THE WISE USE OF LAND AND WATER RESOURCES



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SOIL CONSERVATION SERVICE

U. S. DEPARTMENT OF AGRICULTURE

Wooded . . .

Land that's wooded needs the same intelligent consideration in conservation planning as land that grows cultivated crops, forage, or other useful products.

That's why SCS takes note of woodlands, along with other parts of an owner's property, in helping him decide on long-term goals and how to reach them.

Head Woodland Conservationist C. T. "Cap" Prout, detailing the complex aspects of planning a woodland (p. 36), makes it plain that SCS is concerned with conservation *on woodlands*—not primarily with conservation *of trees.*

Growing and marketing or using trees is more specifically the province of foresters, whose help the landowner also needs, once he has committed certain areas to that use.

Basic Soils: To indicate how basic the soil resource is to the way land is used, when it *is* used for growing trees, we invited field men to report their experiences on this topic.

The almost unlimited variety of these relationships is suggested by three articles by SCS woodland conservationists in this issue: On the way soils information is used by woodland managers in the South (p. 27), on soil-site index studies in Arkansas (p. 31.), and on the integration of the Continuous Forest Inventory in the Lake States with soil classification (p. 35).

COVER: A new owner of an old mountain homestead near Cherrylog in the Limestone Valley Soil and Water Conservation District, Georgia, faces the challenge of planning for the best use of his wooded acres.

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Soil Survey as a Tool for Forest Managers

By George E. Smith, Jr.
Woodland Conservationist, SCS, Columbia, S. C.

THE SOIL SURVEY is becoming an accepted tool of forest managers as they intensify the handling of woodland properties for more efficient timber production.

Many operators in South Carolina, as in other States, are turning to soil maps and woodland interpretations provided by the Soil Conservation Service to evaluate woodcrop potentials of their land and to plan conservation and improvement programs.

Many sites presently contributing little to an operator's income are capable of producing wood crops of high volume and quality if appropriate conservation treatments are applied.

For example, the Toumey Estate in Sumter County, S. C., had some "Carolina bay" land which was producing little, either of wood crops or wildlife. The soil, Grady loam, was known to be excellent for growing pine if supplied with adequate moisture without excessive flooding.

So, water management installations were constructed in 1935. Thirty years later, the tract supported a growth of approximately 11,000 board feet an acre, according to plot measurements by the South Carolina Commission of Forestry. The timber was valued at more than $300 an acre. An earlier thinning had already yielded a harvest of pulpwood.

Continental Can Corporation has had similar experiences in Allendale County. Soils information and planning assistance were provided to both companies through the Sumter County and Allendale County soil and water conservation districts.

In another instance, a forest industry in South Carolina requested information through the conservation district from the Soil Conservation Service to help in establishing a sawtimber rotation to produce loblolly pine averaging 16 inches in diameter at rotation age because the mill handled trees of this size most efficiently. Available soil-woodland interpretations provided information needed, and the owner decided to begin a 42-year rotation on this woodland.

Near Darlington, S. C., E. E. Dargan planted Arizona cypress for Christmas trees. He now harvests them on a 5-year rotation. This species and management are successful partially due to favorable soil and water resources.

The kinds of trees and rates of growth depend to a large degree, though not entirely, on soil and water conditions. Pond cypress tolerates excessively waterlogged soils; by contrast, longleaf pine tolerates the dry sands in the sandhills. Thus, the ability of a soil to grow a particular kind of wood crop is a prime concern to both landowner and industry.

Some soils have superior production potentials and are capable of sustaining heavily stocked stands of high quality trees with excellent growth rates. Such soils justify larger capital investments and expenditures to establish, improve, and harvest trees.

Certain soils in the Atlantic coast flatwoods in South Carolina are considered to be highly pro-

Thirty-year-old slash pine, planted on Grady loam where water level is controlled, yields about 11,000 board feet an acre.

ductive. In some locations similar soils are underlain by phosphate marl which increases their productivity by as much as 230 board feet an acre per year, worth $9.20 at current prices.

In contrast, severely eroded soils with firm material exposed on steep slopes, soils with fragipans or other restrictive layers, and deep sterile sands frequently have such low potentials that they are considered unprofitable to private ownership for commercial wood crop production.

The Rayonier Corporation, a forest industry in the Sattilla River Soil Conservation District in Georgia, leased a tract for 66 years with the objective of growing and harvesting two crops of pulpwood. The company forester planned a 33-year rotation based on the suitability of the soils to produce pulpwood, as indicated by the soil survey.

Soil surveys and interpretations which indicate productivity permit the development of cost-return estimates which are invaluable to many industries and individuals.

Current trends in mechanization of woods operations make soil maps useful to indicate where the large machines can be used.

The newly developed tree combine, for example, cannot be operated on steep rocky slopes and is inefficient on waterlogged soils.

This machine is self-propelled and can be operated by one man. It cuts, delimbs, measures, and bucks trees into pulpwood lengths, then stacks and loads the bolts for hauling to the mill. Two of the machines can produce 50 cords of pulpwood in an 8-hour day.

R. B. Cuthbert, engineer (left), and R. E. Haynes, manager, Southern Woodlands Division, West Virginia Pulp and Paper Company, discuss water management plans with the SCS woodland conservationist (the author).

On some sites (left) the water table can be lowered to make access roads and the operation of large machinery feasible. The tree combine (right) fells, trims, cuts, measures, hauls, and stacks pulpwood with a single operator at the controls. It requires smooth and firm terrain for efficient operation.

Operation on waterlogged soils causes inefficiency, excessive equipment wear and depreciation, damage to soils by puddling and compaction, and injury to tree roots and growth. Some timber companies are draining wet woodlands to make mechanization feasible and to avoid the necessity of stockpiling raw materials during dry periods to prevent mill shutdowns during wet seasons. Extensive water management installations have been constructed in South Carolina woodlands by the West Virginia Pulp and Paper Company and others.

Soil maps and interpretations also show owners the opportunities for multiple-use management.

In the Piedmont section of South Carolina a pulp and paper industry owned a tract of planted pines where the ground cover developed a serious fire hazard. Grazing rights were leased to a cattleman at a charge equivalent to the value of approximately one-third to one-half cord of wood an acre per year. Grazing was controlled so that damage to trees was negligible and the fire hazard was reduced.

At Good Hope Plantation in the Coastal Plains near Ridgeland, in the Beaufort-Jasper Soil and Water Conservation District, wildlife is a major product of the woodland. Here "prescribed" or controlled burning is used to maintain suitable habitat for game species. Management treatment is in accordance with soil interpretations.

The State legislative body has appropriated $35,000 annually to accelerate soil surveys and interpretations prepared by the Soil Conservation Service in cooperation with the South Carolina Experiment Station.

The Forestry Study Committee, a legislative committee, recommended the expanded use of soil survey information and interpretations as a way of improving the productivity of forest lands. ♦

Dense shrub buffer rows on the outside edge of this windbreak stopped snow in the trees rather than letting it blow through to pile up around the farmstead buildings.

Windbreaks in '66 Blizzard

Good ones perform well during the storm but poorly designed ones prove liability

By Arthur E. Ferber
Woodland Conservationist, SCS, Lincoln, Nebr.

PROPERLY DESIGNED farmstead and livestock windbreaks will provide good protection from winter winds and blizzards. This was conclusively demonstrated to farmers and ranchers in the central Dakotas and north-central Nebraska during the March blizzard this year.

Old-timers say the recent blizzard was worse than the one experienced by sod-shanty settlers in 1888. The 1966 storm began last March 2 and howled for 3 days and nights of devastation. It was particularly fierce from Bismark, N. Dak., southward through Pierre, S. Dak., to Valentine, Nebr.

Relentless winds whipped 2 to 3 feet of fresh fallen snow into snowdrifts up to 30 feet deep, paralyzing travel and marooning both country and city people in their homes. Winds averaged 60 to 80 miles an hour, gusting to more than 100 miles an hour in places, and reducing visibility to absolute zero.

Windbreaks—their presence or absence—were frequently mentioned by farmers and ranchers after the storm. Poorly designed farmstead and feedlot windbreaks proved to be worse than none at all. These windbreaks generally had too few rows, no ground-hugging shrubs or evergreen species, or they were planted too close to the buildings or areas needing protection.

Poorly planned windbreaks also

The blizzard suffocated and froze many pheasants. Here, a suffocated cock pheasant found near the South Dakota-Nebraska State line.

This road (left) was free from drifting snow, thanks to a properly designed 10-year-old windbreak. Three rows of trees—caragana, Russian olive, and Siberian elm—were planted 180 feet from road. Where trees were planted too near road (right), snowplows had to clear the way.

caused snow to lodge and pile up to leeward and into the farmyards and corrals. The heavy weight of the snow often collapsed sheds and barns and in some cases even bent the frames of farm machinery.

By contrast, it was found that most well-designed windbreaks did an outstanding job of keeping yards, roads, and livestock areas fairly free of snow. These good windbreaks were at least 10 to 12 rows wide and had a 125- to 150-foot gap between the leeward row and the main buildings and livestock lots.

Most of the snow in these areas was lodged and held in the windbreak itself. Normally, in the drier portions of the Plains, snowdrifts in the windbreak are welcomed since they provide extra moisture for the trees and shrubs.

Field windbreaks helped to hold the snow on the croplands and reduce the quantities available for drifting into farmyards and livestock areas. The more even pattern of snow distribution from field to field may have saved wildlife populations in that area.

It was also observed that trees planted too close to roads caused extreme drifting and blockage. Where possible, there should be a

This herd of cattle came through the blizzard in good shape because the 15-row windbreak, set well back from the lot, held most of the snow in the trees themselves. The farmstead (below) demonstrates how not to build a windbreak. This one was too narrow, not dense enough, and planted too close to the buildings. Drifts rose to an estimated 25 feet, and some of the smaller buildings were completely covered.

A North Dakota farmer dug this passageway into a snowbank which collapsed a shed roof and killed 25 head of yearling cattle. Only one was dug out unhurt. The shed was built too close to the windbreak for a storm as severe as the '66 blizzard.

distance of 12 to 15 rods between field windbreaks and winter-traveled roads.

Damage to trees

The March blizzard this year caused severe breakage of limbs and branches of windbreak trees and shrubs, due to the crushing weight of melting snow. Once the owners have pruned off the broken limbs, however, the damaged plants, particularly the hardwoods, will grow new branches.

Pheasant losses were severe in many areas, although some farmers in more protected locations noted fair survival. The wind blew from several directions, and in many cases tree windbreaks drifted full from one end to the other.

Livestock losses from the blizzard were also heavy. Ranchers cooped up in their homes were unable to reach their animals only a few hundred feet away. Experts estimate that losses may have run close to 100,000 head of cattle, sheep, and hogs.

Storm-related losses in production were likewise severe. Live-

(Continued on p. 42)

How Tall the Tree

Cooperative soil-site index studies aid woodland managers in Arkansas

By Max D. Bolar
Woodland Conservationist, SCS, Little Rock, Ark.

A USEFUL TOOL for managers of both private and public woodlands is being developed rapidly in Arkansas through soil-site index studies.

The studies are being carried out by the Soil Conservation Service, the Southern Forest Experiment Station, the Arkansas Forestry Commission, and several wood-using industries.

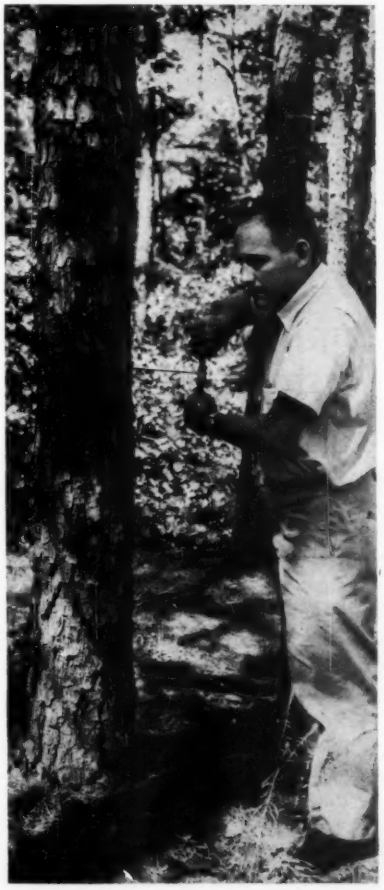
A site index is a way of measuring the potential woodland productivity of woodland soils—that is, how fast trees will grow on a given soil.

Where farmers may say, "This soil will grow two bales of cotton an acre," or "that soil will grow 80 bushels of corn," foresters and soil scientists may say, "This soil is a 100-foot site," or "that soil is a 60-foot site." They mean trees of a certain species on one soil will grow 100 feet tall in 50 years, whereas on another soil the same trees will grow 60 feet tall.

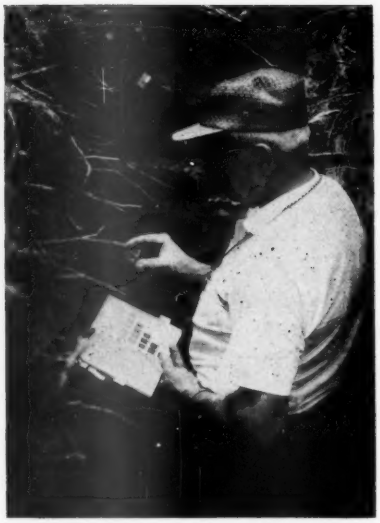
Forester and soil scientist

In a site index study, a team composed of at least one forester and one soil scientist select what both agree is a typical tree and soil site. The soil scientist digs a "grave-size" pit in order to get a profile description for determining which soil he is dealing with. He determines the thickness of the various soil layers and their boundaries; the texture, structure, and consistency of the soil in each layer; the pH (degree of acidity or alkalinity); and many other details about the soil.

The forester selects five of the dominant trees and determines their average height and age. He gets the age by boring into the center of the tree with an increment borer, extracting a plug about the size of a lead pencil and counting the number of growth rings. The forester applies the age and height data to a system of



Bill Freeman of the Arkansas State Forestry Commission uses an increment borer to determine the age of a tree.



Left, Dave Graney (left) and Lee Campbell of the Southern Forest Experiment Station dig a pit for inspection of the soils at this forest site. Right, in the backhoe-dug pit SCS Soil Scientist Tom Millard checks a soil sample against a color chart to help him classify the soil.

predetermined curves and graphs to get the site index. For example, a loblolly pine that is 35 years old and 75 feet high indicates a site index of 88.

The site index team may sample a dozen sites on the same kind of soil at different locations. In most cases, all samples will show about the same site index.

Eventually, all or most of the woodland soils in Arkansas will be site indexed. Then—using soil maps provided by the Soil Conservation Service—farmers, ranchers, woodland owners, woodland industries, national forests, and State forests can determine the site index for their respective woodlands.

This knowledge will help determine the type of woodland management to apply, the kinds of trees that are practical to plant and manage, and the amount of pulp or sawlog production to expect.

Team effort is helping make this useful information available faster. ♦

Improved Woodland Pastures Restore Tree-Grass Balance

By Robert J. Olson
Woodland Conservationist, SCS, Spokane, Wash.

SEVERAL eastern Washington farmers, owners of stagnated "bull" pine stands too thick to grow any grass or much timber, are showing how both can be produced profitably.

They are thinning out excess trees with bulldozers so the remaining trees can grow timber at a faster rate. An improved pasture of adapted grasses is then seeded under the well spaced trees.

For Herb Armstrong of Harrington, a cooperator with the Sprague-Harrington Soil Conservation District, this method is past the trial stage. He has already thinned more than a hundred acres of ponderosa pine on his farm north of Davenport near Porcupine Bay on the lower Spokane River. He is expanding his operations so he can do more each year.

Bulldozer used

Armstrong uses a bulldozer to take out the unwanted trees. He backs into the stand, then lifts out or tips over the smaller, weaker, and poorly formed trees in such a way that they can be pushed out of the stand, crown first, without damaging the ones left to grow.

After the broken limbs, tops, and roots are cleaned up, a heavy disking puts ground in shape for seeding. The usual tame pasture grasses adapted to the climate and soils are used. With a spacing of 16 feet or more between trees, grass can be seeded with an ordinary grass drill. An area cleared during the winter may be planted in the spring, or it may be summer-fallowed for a year before seeding. Application of 20 to 30 pounds of nitrogen an acre gives the grass a good boost the first year.

Thinning ponderosa pine stands this way is a money-making proposition. The best, most productive

trees are left. They grow faster and reach a commercial size quicker than they would in a dense thicket. The soil, sunlight, and moisture formerly used by the trees that were dozed out can now contribute to growing grass. The grass used as pasture gives an immediate return from the land; the remaining trees make a good long-term investment.

Opening pine stand

Opening up a pine stand and seeding it to grass works best in the area of scattered timberlands between the prairies or natural grasslands and the dense, more moist timberlands. Soils here are sandy or gravelly and light enough to stand dozing and grazing.

Here trees and grass grow together naturally. Past misuse of the land has reduced the grass to low condition and caused dense thickets to develop. Such areas produce little forage, and the dense pine grows slowly.

Removing all the trees often dries out the soil so that few grasses will grow. Where the pines are only thinned, however, the trees grow faster, and the grass grows better.

Eastern Washington has a lot of this kind of woodland. Many old timers remember when these same areas were open park-like stands of big trees and lush forage. There are different ideas as to how past misuse has caused areas to "dog hair" back. Some think it is because the grass and forest fires have been controlled. Others say it is because of overgrazing and bad logging practices.

There are other reasons, too, why landowners are thinning their woodlands. Reducing the fire hazard is especially important near centers of heavy population. Fire danger is minimized because there is little chance of ground fire crowning through the widely opened trees.

Cattle are kept from "holing up" in thickets, and riding is easier.

Where thinned areas are to be used for recreation or beautification, low-growing grasses can be seeded instead of pasture grasses. Plants preferred as food by elk and deer can be used if it is desired to improve hunting.

One of the main reasons that many woodland owners do a good job of developing pasture in their woodlands is the pride of ownership.

Whatever the reason, Armstrong and farmers like him are changing pine woodlands back to the way nature had them before the white man came. They have found that copying rather than fighting nature is the most profitable way to handle their woodlands. ♦

A 2-year old grass-legume mixture in a stand of ponderosa pine thinned with a bulldozer.

A dense stand of pine thinned in the conventional manner with a chain saw (left) could not be seeded with a drill because of the stumps. A similar stand thinned with a bulldozer (right) is ready for seedbed preparation.

Conservation Helps Make Religious Camp "Home in Woods"

A SOIL AND WATER conservation plan has made 338 acres of rolling countryside into a "home in the woods" for more than 500 boys and girls in Hocking County, near Logan, Ohio.

Camp Otterbein's lodge and 14 cabins are nestled in some 30,000 pines overlooking a green and well-kept valley. The camp, which belongs to the Ohio Southeast Conference Evangelical United Brethern Church, was purchased in 1958. The church board asked Dr. L. B. Sharp, then of the Outdoor Association of New York City, and later the executive director of the Outdoor Education Association at Southern Illinois University, to assist in developing a master camp plan.

With Dr. Sharp's encouragement, the church board applied to the Hocking Soil and Water Conservation District for help in developing the entire 338 acres. Through the district, the Soil Conservation Service provided technical aid in tree planting, woodland improvement, wildlife food and cover areas, seedings for recreation and picnic areas, and the construction of several lakes.

Activities at Camp Otterbein begin each morning with a flag pole ceremony, followed by morning watch devotions, breakfast, and singing. Afterwards, each group selects a new "home in the woods" where they will spend the day. Here they build a fireplace for cooking meals, and also a simple place of worship. The day is passed in bible study, hiking, nature study, and games.

Last summer, some 560 young people enjoyed a summer at the camp, and at least as many are expected this year. All of them will enjoy the green and well-planned beauty that soil and water conservation measures have brought to the area.—WALLACE A. GILLOGLY, *Work Unit Conservationist, SCS, Logan, Ohio.* ♦

Below, happy campers return to the lodge from their day in the woods. The camp has 30,000 pine trees. Right, what's better than home cooking, when the home is a woods? Boys prepare an impromptu fireplace while, offstage, the girls start dinner.

Soils Information Adds Value to Continuous Forest Inventory

By Jacques J. Pinkard
Woodland Conservationist, SCS, East Lansing, Mich.

THE ADDITION of soils information to the data being collected by the Ford Forestry Center's continuous forest inventory at L'Anse, Mich., yields information of value to woodland managers over a wide area.

"This work provides the first reliable data on the range of productivity and on mean productivity, of all the soils classified on the plots," says Dr. Eric Bourdo, director of the center.

The Soil Conservation Service is classifying and describing the soils on each of the inventory plots in response to a request from Dr. Bourdo to the Baraga Soil Conservation District for assistance in relating the continuous forest inventory (CFI) to soil characteristics.

Dr. Bourdo's ultimate goal is to find the relationship between soil classification and timber stands at the Ford Forestry Center as well as on some 7,000 to 9,000 established check plots within the immediate vicinity.

Continuous forest inventory is a tool in forest management often used by wood products industries. In establishing a CFI system, sample plots are permanently located throughout the woodland property, and periodic measurements are taken and recorded in accordance with statistical standards. Plots usually are one-tenth to one-fourth acre in size. Trees on the plots are treated and managed the same as those in surrounding areas.

Measurement data usually consist of recording species present, diameters, heights, vigor, form class, quality, merchantable height, mortality, and others, plus general characteristics of each plot. From these data, forest managers can analyze and compute wood volume, quality, species composition, and periodic growth.

The CFI system is an outgrowth of the European method of inventory control. Several changes have been made to adapt it to American forestry. One is the use of sample plots instead of tallying an entire extensive woodland. Another is the use of electronic computers to compile and analyze data.

The computer procedure, once devised, can be used repeatedly for all reinventories. Once in operation, this is an economical way of providing woodland owners with fairly accurate information on the amount and kinds of wood products they own and what might be expected in future growth.

To obtain the soils data needed to achieve Dr. Bourdo's objectives, soil scientists and foresters locate the CFI plots on general soil maps prior to classifying them. They dig a pit to a depth necessary to properly classify the soil. The soil scientist examines each layer of soil for such properties as thickness, color, texture, structure, consistence, reaction, and boundary between layers. He then notes slope, aspect, erosion, root distribution, stoniness, and ground water. The soils are then named and correlated in the national soil classification system.

There have been only a few attempts to correlate timber stand or timber quality with the various kinds of soil as a part of the continuous forest inventory.

The special interest of the Ford Forestry Center in this correlation is understandable. The center is located in Michigan's Upper Peninsula, which is 90 percent forested. It is dedicated to the future of Michigan's forests and to the economic well-being of the Upper Peninsula. The center was created in 1954 when the Ford Motor Company donated to the Michigan College of Mining and Technology, now Michigan Technological University, the community of Alberta with its excellent sawmill and 1,703 acres of adjacent forest.

Dr. Bourdo will prepare an annual summary of progress from data he receives from the SCS. He will then call in a committee of soil scientists and foresters representing the Michigan Department of Conservation, the Cooperative Extension Service, the Michigan Agricultural Experiment Station, the U. S. Forest Service Regional Office, the Lake States Forest Experiment Station, the Soil Conservation Service, and other agency and industry leaders who are interested in the work.

This committee will review progress yearly to determine whether the work is to be continued. Future inputs of soil survey and other information will depend on these evaluations.

Present CFI systems in Michigan had their beginning in 1937. Nationwide, data resulting from CFI are being used in the management of more than 85 million acres, 57 million acres of which is federally or State owned. Twenty-six million acres are operated by 100 companies, 24 of which are in the 9-State area of the Lake and Central States.

In Delta County, Mich., CFI plots are to be classified in 1966-67. This is a logical place for CFI correlation studies because a progressive soil survey is being made there at this time. Soils to be classified first are those that occupy a considerable acreage and are important to the forest economy.

It is hoped that these studies on relationships of tree growth to soils and sites can be worked out on a representative sampling of CFI plots in central and northern Michigan and adjoining States. ♦

Principles of Planning a Woodland

By C. T. Prout, Jr.
Head Woodland Conservationist, SCS

PLANNING a woodland for sustained performance as part of a balanced farm or ranch operation, as a commercial wood crop enterprise, or as a recreational retreat, is a complex procedure.

A workable plan must match the physical resources of the tract to the economic and personal circumstances and desires of the owner or operator.

Sometimes, a man must stand alone. Although no one is ever entirely self-sufficient, the land owner or operator alone can make the decision to use his land for a specific purpose. He must weigh the facts provided and the counsel given by service agencies and advisers; he alone can commit himself to the course that best leads to his conservation and production objectives.

The woods owner must see the need and desire the results of conservation before he will plan seriously for the long term. This may be a deep-seated and long-lived thing. Or it may have started when he attended a demonstration of forestry practices sponsored by the Extension Service and his conservation district (below).

His woodland may be in a tract by itself, or it may be part of a farming or ranching unit (above). His holdings may be divided between forest, pasture, cropland, and other uses. In any event, he needs to take stock of the resources that are his.

These resources are related to the kinds of soil he has (right). He needs to know the capabilities of each soil for various uses and its potentials for growing trees and other types of vegetation. He needs to know the alternative uses to which his land can be put. This information can be supplied through the local conservation district by the SCS conservationist.

He must choose from the feasible alternatives and define his objectives.

He may decide to convert open cropland or pasture to woodland, or to change some of the land now growing trees to other uses. He may or may not wish primarily to grow wood products for the market. He may place a higher value on the enjoyment of his woods through hunting (left) or simply making the forest more attractive and accessible as a place of natural beauty.

In making this choice he needs also to know something of his own capabilities—whether he will be able to do the work in the woods himself and whether he has the financial resources to invest in long-term woodland development.

He reaches the decision point once he has taken stock of the resources of his tract and considered the alternatives that are within his reach.

Then the woodland owner or operator must decide the kinds or practices and the amounts of each to be applied. If he wishes to develop a practical conservation program, he must know the adaptabilities of different kinds of trees to the kinds of soil he has. He must know what these trees are, what they look like, and what he needs to do to protect them and make them grow.

If he plans to use his land for the production of a wood crop, he needs to know the kinds of practices that will give optimum production. Again, he must make the decisions.

These decisions, systematically recorded, make up his conservation plan. The soil conservationist, available through his local conservation district, can help him consider the alternatives and record his plan.

For more intensive forest management, he may desire the services of a professional forester. He may request assistance from the State forest agency, or he may engage a consulting forester on a fee basis.

The forester can go into detail in helping him plan his forest management (left). He can determine the volume of standing timber, how fast the trees are growing now, and their probable rate of growth in the future.

He can help him determine how much timber could be harvested, and how and when, to get a periodic income. He can give help and advice in locating markets for the timber that is for sale.

The best of plans are to no avail unless they are carried out. Some owners may want to do all the work themselves. They will need to know about the tools needed and how to use them.

Others may prefer to lease the tools or to hire the work done. They may be able to get help through their local conservation district.

In many districts, such equipment as tree planting machines, pruning saws, planting bars, hardwood control devices, and the like are available for the use of district cooperators. In others, contractors make a business of woods work.

The final payoff of a woodland enterprise is the sale of the wood product. A knowledge of markets, prices, quality, and the like is necessary for the owner to wisely market his product.

The professional foresters of public agencies or of industries and consulting foresters are available to render this kind of service.

Cooperation? Yes, the landowner becomes a cooperator with his local soil and water conservation district. The Soil Conservation Service helps him make a complete conservation plan for his entire property, including the woodland as one of the land uses. Other agencies, industry, and private foresters cooperate with the district to provide the services that will help the individual carry out sound conservation and woodland management to satisfy his needs today and in the future. ♦

The precast concrete structure with automatic gate in open position, above, and closed, below. The timing device is above the metal gate.

Automatic Basin System Reduces Irrigation Water and Labor Needs

By Leon Kimberlin
Conservation Agronomist, SCS, Phoenix, Ariz.

AN AUTOMATIC basin irrigation system enables J. T. "Ted" Gilcrease of Clark County, Nev., to irrigate 215 acres of alfalfa with only 1 hour of labor each day.

In addition, he gets more efficient use of his irrigation water and has stopped the wastage of tailwater into the desert.

Gilcrease, a dedicated conservationist and supervisor of Vegas Valley Soil Conservation District, has worked out a system of recessed field ditches and clock-operated check gates to fully automate his irrigation job.

"I started working with 10 acres of basin irrigation in 1946," says Gilcrease, "because I was tired of seeing tailwater run into the desert at the ends of my fields. The savings in water and increased hay yields looked good to me."

Gilcrease liked everything about his new system except getting up at night to change the irrigation water. He looked for ways to reduce labor without sacrificing irrigation efficiencies.

By 1959 he had worked out the details to automate the system. This called for leveling land across the slope in dead-level basins. He constructed field ditches so the tops were level with the field surface.

The ditches run through the center of each basin and stair step downhill with a check-gate at each step between basins. Check structures are made of precast concrete with swinging metal gates which, when closed, raise the water level in the ditch to flood the basin just upstream from the check-gate.

Gates are latched in the open position at the beginning of irrigation. Timers are set to allow gates to close and change the flow of water from one basin to the next. Irrigation begins at the lower end of the field and pro-

J. T. Gilcrease (right) and SCS Conservationist Richard Capurro are on the border between two basins where water "stair steps" down through an automatic gate. When the gate is closed, the water backs up in the ditch behind the men and floods the basin on either side.

gresses up the ditch as the gates close in timed succession.

Timers are interchangeable and can be moved from one gate to another. Gilcrease has enough timers to automate 12 hours of irrigation at one time. It takes him 30 minutes to set up for a full 12 hours of irrigation.

The size of basins is dependent upon the intake rate of the soil and the size of the irrigation stream delivered by the ditch. Although Gilcrease uses small basins (1.7 acres in each), most field operations are performed across the basins with one-half mile between turns for large-sized equipment.

He keeps the difference in elevation between basins to 1 foot or less, for ease in handling equipment. But he explains that a difference in elevation of at least 6 inches is necessary for the system to work properly.

87 percent efficiency

On his basin-irrigated fields, Gilcrease produces a crop of alfalfa with only 72 acre-inches of water, at an overall irrigation efficiency of 87 percent. This means that only 13 percent of the water entering the system escapes by seepage, deep percolation, or is otherwise lost to crop use—an exceptionally low figure.

"I've increased irrigation efficiency by 20 percent while reducing labor requirements more than 80 percent," Gilcrease says.

So far, he has converted 215 acres from graded slope to automatic basin irrigation. He plans to convert about 35 acres each year until his entire 480 acres of irrigated land has been automated. He builds his own check structures and does his own leveling.

At current contracting and materials prices, Gilcrease estimates it costs $80 to $100 an acre to change to the new system. These costs are rapidly recovered through savings in water, reduced labor, and increased hay yields. ♦

SCS Plots Test Plants to Find Better Duck Foods

By Clifford C. Sorensen and Harry A. George
Plant Materials Specialist, SCS, and Game Manager, California Department of Fish and Game, Pleasanton, Calif.

LAND OWNERS and wildlife biologists seeking ways to improve winter habitat for waterfowl in California have stimulated a program of testing food plants at the SCS Plant Materials Center at Pleasanton.

Millions of waterfowl migrate along the Pacific flyway each year and make California their primary wintering ground.

As agriculture, industry, and urbanization reduce the waterfowl habitat, causing the birds to turn to agricultural crops for much of their food, landowners have become interested in improving the remaining marshland and converting marginal land into good waterfowl habitat.

SCS conservationists and game department biologists were asking, "What and how should we plant on these areas?"

A three-way agreement between the California Department of Fish and Game, California Division of Soil Conservation, and the Soil Conservation Service in 1958 initiated a systematic testing program for improving grasses and legumes for waterfowl food.

Formal testing of waterfowl food plants began in the spring of 1959. Species were grouped according to agronomic characteris-

Workmen harvest promising waterfowl food plants at testing center. Because of small size of plots, all work had to be done by hand.

General view of waterfowl food plants in initial tests at the Pleasanton Plant Materials Center.

tics, water requirements, and growth habit.

Ponds were constructed so the amount, depth, and frequency of irrigation could be controlled to simulate marsh or shallow water conditions.

Species selected were seeded in 20-foot rows, 30 inches apart. This allowed easy access for observations and weed control. Because of number of species involved and length of rows, all work in the ponds was done by hand.

Plant performance was observed and compared throughout the growing season. At the end of each season, each row was harvested. The material was placed in cotton bags and dried, and forage and seed yields were determined.

This system made it possible to test and evaluate a large number of plants in a short time. Since 1959, more than 500 accessions, representing 12 use groups of waterfowl food plants, have been tested. Other use groups will be brought into the testing program at a later date.

Second step in the systematic testing process consisted of seeding selected species in ¼-acre plots at the Gray Lodge Field Evaluation Planting near Gridley, Calif. Work at this site is carried out by the California Department of Fish and Game. Technical and onsite assistance is provided by the Pleasanton Plant Materials Center.

To obtain enough seed for plots of the Gray Lodge evaluation plantings, superior species were selected from the initial testing and put into small-scale increase plantings. The best methods of harvesting, threshing, and cleaning each kind of seed were also determined.

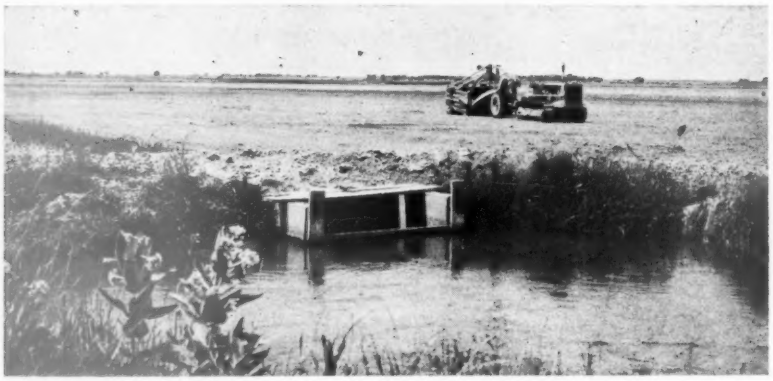
To date, selected strains of watergrass, bulrush, smartweeds, millets, perennial grasses, and vetch have been tested at Gray Lodge. Three or four new accessions probably will be seeded each year. Each plot will be maintained for 5 years, during which plants will be comparatively evaluated on aspects important to waterfowl.

Plants that continue to show superiority will be placed in field size plantings on cooperators' farms in soil conservation districts, State and Federal refuges, and on duck club land.

During these final tests under actual use conditions, specific soil and climatic adaptation as well as actual usage by waterfowl will be determined. Superior plants from these final tests will be certified and released for commercial production. ♦

Mallard ducks rising from a field of watergrass at the Gray Lodge Waterfowl Management Area near Gridley, Calif.

Water Control for Better Pasture



Land leveling on the Green Brothers farm to aid uniform water distribution.

IMPROVED water management has meant better pasture and easier farming to Calvin and Cecil Green.

Calvin and Cecil own and operate a 923-acre livestock farm northwest of Rigby, Idaho. They purchased an additional 240 acres that was cut up with ditches, making fields odd shaped and uneven—and difficult to farm. A high water table further limited farming operations and made proper irrigation of crops impossible.

Most of the land was in native grass and weeds which provided little grazing for their beef cattle.

With SCS technical help through the Jefferson Soil and Water Conservation District, the Green brothers developed a complete conservation plan for the farm. Under the plan they did land leveling on 160 acres and installed 9,240 feet of new irrigation ditches; 1,400 feet of open field drains; and 200 feet of buried drainpipe. An existing drain serving several farms was cleaned and enlarged.

Most of the land will be seeded to improved permanent pasture and will furnish supplemental feed for the livestock.

With these improvements completed, the farm now will furnish better forage with a minimum of labor.—ALBERT NEU, *Soil Conservationist, SCS, Challis, Idaho.* ♦

Windbreaks

(Continued from p 31.)

stock drifted for many miles in the range country. Many suffocated in sheds and corrals, and in some cases shed roofs collapsed from the weight of snowdrifts.

Fortunately the loss of human lives was relatively small from the blizzard. Temperatures were not cold—as blizzards go—hovering between 5 and 10 degrees above zero.

Some lessons learned

Plains farmers and ranchers are a hardy lot, but they can take advantage of the lessons learned from the big blizzard of '66. In many cases present windbreaks can be improved by planting additional evergreen and shrub rows.

Farmsteads with windbreaks on only one side can be made more livable with additions to provide protection from other directions. The average Northern Plains farmstead or ranch area needs winter protection from the west, north, and east.

Competent conservationists and foresters are available in most counties to help landowners assess the effectiveness of their windbreak layout and to suggest improvements where needed. Most soil conservation districts have trained tree planting crews and the facilities they need to help make the Plains a better place in which to live.

Killer blizzards as severe, and with as much snowfall, as the 1966 blizzard occur only about once every 20 years or so on the Plains. But when they come, people should be prepared.

Tree windbreaks will help to weather these recurring catastrophies. Many more of them are needed. ♦

Pond Fees Dedicated to Farmer's Church

A farmer-cooperator dairyman in the Marion County Soil Conservation District, Miss., pledged to his church the fishing proceeds from 1 of 13 ponds on his 300-acre farm. In 5 years they amounted to $2,000.

The Olah Methodist Church near Columbia had gone heavily into debt to pay off building costs. Steward Lewis Wesley decided to help by contributing the fishing fees from a 2-acre lake and part of the profit from fish fries held when he drains the pond.

Wesley, who got SCS assistance in designing his pond, followed prescribed practices of stocking, fertilizing, and deepening of edges. The pond Wesley dedicated to the church also furnishes water for livestock and garden irrigation. ♦

Population in Appalachia

Although Appalachia's total rural population descreased only slightly in 1950-59, its farm population declined 57 percent in the Appalachian region, compared to 43 percent in the surrounding area and in the United States. ♦

Three New RC&D Projects Plan for Economic Growth

A WIDE RANGE of project measures aimed at improving employment and business opportunities through local initiative and investment are planned in three new Resource Conservation and Development projects recently authorized by Secretary of Agriculture Orville L. Freeman for Federal assistance in carrying out the proposals.

Following are resumés of the project plans, prepared with the cooperation of State and Federal agencies under the leadership of the Soil Conservation Service:

Bitter Root Valley, Mont.

The Bitter Root Valley Resource Conservation and Development Project in western Montana covers 1,800,760 acres in Ravalli and Missoula counties, of which about 1,221,000 acres is federally owned. The project area, primarily agricultural, has a population of about 15,000. Cattle is the chief source of income on most farms. Hay and pasture are the main crops.

The area is rich in history, having been traveled by the Lewis and Clark expedition and was the scene of Indian wars.

The project is sponsored by the Bitter Root Soil and Water Conservation District, the county commissioners of Ravalli and Missoula counties, and the Missoula Soil and Water Conservation District.

The sponsors estimate that planned project measures will create more than 6,300 man-years of employment during the next 20 years, with an equal number of man-years of employment created in commercial and service industries in the area.

Sponsors plan at once to complete rehabilitation of 10 high mountain storage dams and reservoirs; support and encourage full development of public and private recreation facilities in the project area; stimulate opportunities for commercial use of woodland products by small woodland owners; accelerate conservation planning assistance; install gravity flow sprinkler irrigation systems in the Bitter Root Valley Irrigation District; initiate action on a water needs study of future requirements for municipal, agricultural, industrial, fish and wildlife, and recreational uses.

Long-term actions are expected to complete the Burnt Fork Dam project; assist local people in developing recreation facilities; coordinate rangeland planning for range improvement on about 139,000 acres of privately owned land; develop or improve water storage on 25 multiple purpose projects; develop 75 miles of access roads to recreation areas; provide a means to inventory, restore, and preserve historical sites and areas; develop job opportunities for supplemental income for uneconomic farm units; improve private forest woodlands; and strive for better use of all forest resources.

Arkansas River Valley, Ark.

The Arkansas River Valley Resource Conservation and Development Project covers about 3.7 million acres in Crawford, Franklin, Johnson, Logan, Pope, Scott, Sebastian, and Yell counties in west-central Arkansas. About 44 percent of the area is in woodland, including 1,238,000 acres of national forests. The 8 counties have a population of about 167,000.

The project sponsors anticipate that net income in the area will increase $6 million annually over a 10-year period. They expect long-term industrial growth to provide 10,000 new jobs and tourism to open 5,000 new job opportunities as the local economy expands under impetus from the intensified resource conservation and development program.

Under the plan, an accelerated watershed improvement program is proposed for flood protection to 200,000 acres of bottom land; conservation protection to 2.5 million acres; multiple use municipal and industrial water systems for 30 towns and cities; improved agricultural production; and expanded public and private recreation facilities.

Acceleration of multiple purpose recreation improvements in the Ouachita and Ozark National Forests to help meet outdoor recreational demands also are proposed in the plan, as well as wildlife and other developments.

The project sponsors expect work to begin in the near future on such measures as the Mount Magazine Girl Scout Council permanent camp; Jones Creek Recreation Lake in the Poteau River watershed; Little Clear Creek watershed multiple purpose dam at Alma; planning of the Flat Rock Creek watershed near Van Buren and the Cedar Creek watershed multiple purpose dam for town water at Havana, Danville, and Belleville; strip-mine reclamation for a golf course and recreation area at Russellville; Mays Branch irrigation, storage, and flood detention dam in Crawford County; and accelerated conservation planning and land treatment in the project area.

St. John-Aroostook, Maine

The St. John-Aroostook Resource Conservation and Development Project in Maine includes 2.7 million acres in 107 townships in southern and northeastern Aroostook County and 4 townships in Penobscot County. More than 2.1 million acres of the area is timberland. Also included are the intensively farmed potato lands of Aroostook County.

The work plan was developed by the local project sponsors with assistance of 17 Federal, 18 State, and 14 local agencies. Local sponsors are the Central Aroostook, Southern Aroostook, and St. John Valley soil and water conservation districts, Aroostook and Penobscot County commissioners, and 65 towns.

Sponsors estimate that over the next 20 years, application of project measures will result in 3,000 additional man-years of employment. They expect the project to result in economic improvement through increased agricultural income, diversified industry that will increase job opportunities, and better use of natural resources.

Some of the project measures are already under way, many will be started immediately, and others —many of which will deal with industrial and recreational expansion—will be added as the project progresses.

Forty-nine project measures are proposed in the plan. They include additional soil surveys, land and resource plans for individual towns, accelerated land treatment, sediment-control projects, small watershed projects, development of sugar beet industry, fish and wildlife development, flood prevention and municipal water supply for Westfield and Washburn, recreation developments, treatment and improved management of woodlands, water supply and distribution system for Eagle Lake, and better sewage disposal facilities for communities.

A few of the numerous measures the sponsors expect to be started in the near future include acceleration of conservation planning, land treatment and forestry measures, erosion control at the Van Buren hospital site, development of town land and water resource plans, erosion and water control at Presque Isle and Mars Hill, and construction of Caribou Golf Course. ♦

National Study of Strip-Mined Areas

The Federal Government under the 1965 Appalachian Regional Development Act has launched a nationwide study of strip and surface mining.

Before the Act, attention to this problem was concentrated primarily in the Appalachian States, especially to mining of coal and of sand and gravel.

The new study involves the gathering of physical data on surface-mined areas throughout the 50 States, the making of observations on surface areas disturbed to recover 56 different kinds of minerals, and the inclusion of all areas mined regardless of date.

Under the leadership of the Bureau of Mines, the Tennessee Valley Authority, Bureau of Land Management, Forest Service, Soil Conservation Service, and the cooperating States, experienced field personnel most intimately associated with the areas where mining has taken place will make onsite appraisal of the physical conditions of these areas. Because of the volume of the data collected, these teams plan to use electronic methods to analyze the data.

The purpose of the study is to present recommendations to the President, and he in turn to the Congress, for a long-range comprehensive program for reclamation of such areas.

USDA plans to use these data also to assist soil conservation districts in the development of their short- and long-term conservation programs and in updating the Conservation Needs Inventory. ♦

Forest Cutting

During the past 150 years the forest lands in most of the southern Appalachian, Allegheny, White, and Green Mountains in the Eastern United States have been cut over one, two, or more times. ♦

Plowing Match to Show New Practices

A FEATURE of the conservation demonstrations at "Agrirama, U.S.A.," the 1966 National Plowing Matches and Soil Conservation Field Days, will be terraces with tile outlets and seeded back slopes which can take the place of grass waterways.

Also of interest will be a model farm pond with its wildlife refuge, planned jointly by the Iowa Conservation Commission, Iowa Extension Service, and the Soil Conservation Service. There will also be a pasture renovation project and contouring and tiling demonstrations.

Between 100,000 to 150,000 midwesterners are expected to attend the event in Jefferson, Iowa, September 8 to 9.

Agronomy demonstrations include 20-, 30-, and 40-inch corn row comparisons in which 18 seed corn companies are participating; similar demonstrations with soybeans, grain, and forage sorghums; comparisons of rates of application of herbicides and insecticides; corn yield tests with a goal of 250 bushels an acre.

Educational tours will be held for mostly seventh and eighth graders, who come from far and near in their school buses. ♦

Farm Ponds Solve Water Problem

Farm ponds now solve the water shortage problem of a Negro farmer in the Sherman Hill Community in Mississippi. Esau Carter, a cooperator with the Scott County Soil Conservation District, built three ponds with ACP funds and SCS technical help through the district.

"Before the ponds were dug," says Carter, "I had to drive cattle 3 miles every day to get water during the dry season. This took 3 or 4 hours daily. We hauled water to the hogs."

CONSERVATION PROFILE

R. Sloan Rainwater

Arkansas

Love of land culminates in watershed project

A TRADITIONAL love of the land, handed down from generation to generation to R. Sloan Rainwater, is being gratified as the Flat Creek Small Watershed Project in Arkansas nears completion.

Mr. Rainwater lives in the same valley where his great grandfather settled long ago on the bank of the creek.

Sloan Rainwater is chairman of the Lawrence County Soil and Water Conservation District board of supervisors and has worked long and diligently to organize the watershed project and see it to completion.

Sloan Rainwater was born 3 miles southwest of Imboden on a poor 80-acre hill farm. The third child in a large family, he worked hard to finish Imboden Public School in 1909 and later graduated from Sloan Hendrix Academy and then from the University of Arkansas in 1916. He came out of World War I a pharmacist's mate, attended Little Rock Pharmacy School, and eventually owned and operated three drug stores. He also was county superintendent of schools for 15 years and has served as president of three banks at various times.

While a young man, he began buying small tracts of land and now owns some of the most productive cotton, rice, and soybean land in Lawrence County.

"The first $1,000 I ever saved for investment was made from the sale of cotton and timber from my land," he says.

His first cotton gin was built in 1926. He has operated continuously in that business since, in as many as 3 States and 10 counties. In 1962 his company handled more than $3 million worth of soybeans and cotton.

Mr. Rainwater is active in the Methodist Church and Masonic Lodge; has served on the boards of colleges and other county and State institutions.

Because of his love of the land, in 1938 he helped organize the Tri-River Soil Conservation District, comprising three watersheds in three counties. When the Lawrence County District was created, he was elected the first chairman of its board of supervisors and has served in that capacity ever since.

He served as president of the Arkansas Association of Soil and Water Conservation Districts from 1948 to 1955. He wrote its constitution and bylaws and was responsible for setting up its organizational structure dividing the State into seven areas.

Rainwater was Arkansas' representative on the Council of the National Association of Soil and Water Conservation Districts from 1949 to 1956 and assisted in writing its organizational pattern and handbook. He was vice president of the Gulf area 1955-60; member of the board of directors 2 years; and chairman of the National Committee for Conservation Field Days and Plowing Matches for 6 years.

Mr. Rainwater gives credit for much of his success to his wife, the former Virginia Hatcher. They have two sons, one a lawyer and professor at Little Rock University and the other a civil engineer, and two grandchildren.

The Rainwaters spend their happiest hours in their new summer home on the bank of beautiful Spring River from which they can see their herd of purebred Angus cattle grazing.—A. J. TROXELL, *Executive Director, Arkansas Soil and Water Conservation Commission, Little Rock, Ark.* ♦

Watershed Story at Flower Show

Five northeastern Illinois soil and water conservation districts presented an exhibit on watershed conservation to the Chicagoland Flower Show last March.

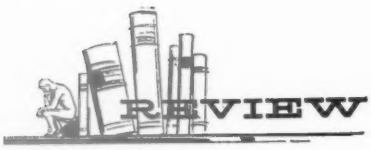
Four hundred thousand persons viewed the 6-foot-long styrofoam relief model of the local Salt Creek watershed in the 10 days it was displayed.

The show's sponsors rewarded the multidistrict effort with an Award of Merit.

In addition to the sculptured and painted model of a real suburban watershed, there were printed cards, drawings, and maps pointing out the benefits of a watershed protection and flood prevention project.

Cost of the $1,700 display was shared by McHenry, Lake, Kane-Dupage, North Cook, and Will districts.

John Quay, landscape architect and vice chairman of the Lake County Regional Planning Commission, designed the exhibit. Show officials gave the districts free display space. ♦



Silvics of Forest Trees of the United States. EDITED BY H. A. FOWELLS. *1965. USDA Agr. Hbk. 271. 762 pp., illus.; paper. $4.25.*

In "Silvics of Forest Trees of the United States," the reader can draw on the work of a decade of Forest Service activities in the field of dendrology and silviculture for essential information about the more important species of forest trees in this country.

In 1955, under the leadership of F. H. Eyre, then director of the Division of Timber Management Research, the Forest Service began to document information for tree species throughout the United States. The various forest experiment stations published 127 reports as station releases. Ten years later, with some rewriting and modifications, this compendium of 125 species was published.

For each species there is a brief description of the tree and its habitat, followed by a section on habitat conditions in which the climate, soils, and topography are described, and associated trees and shrubs usually found growing with the species are listed.

In a section on life history, the reproduction and early growth of the species, growth of the tree from sapling stage to maturity, reaction to competition, and principal enemies, including insects, diseases, and other pests, are described.

Since there are few tree species in the United States without some racial variations, there is a section on races and hybrids.

A list of references for each species is provided.

This work will be valuable to practicing foresters and technicians interested in the silvical characteristics of trees and to laymen with an interest in the subject, as well as to research organizations, universities, and colleges. It will be a welcome addition to any library on natural vegetation. —CARROW T. PROUT, JR., *Head Woodland Conservationist, SCS.*

New Publications

Water Quality of the Potomac River Estuary at Washington, D. C. BY W. H. DURUM AND W. B. LANGBEIN. *1966. U. S. Geol. Surv. Circ. 529-A. 9 pp., charts and map.* A summary description of water conditions at and below the Nation's capital, a major concern of the President's plan for the Potomac. "Nearly 3 million tons of sediment is discharged annually by the Potomac River. Areas in the Washington metropolitan area undergoing urbanization have rates of sediment yield that are 50 times greater than rates in rural areas."

Total Porosity and Random Roughness of the Interrow Zone as Influenced by Tillage. BY R. R. ALLMARAS, R. E. BURWELL, W. E. LARSON, AND R. F. HOLT. *1966. USDA Conserv. Res. Rpt. 7. 22 pp., illus.* Estimations made and tested of total porosity and random roughness for areas between 40-inch corn rows (the interrow) in tillage experiments on Barnes-Aastad, Nicollet-Webster, and Kranzburg-Poinsett soil associations in western Minnesota and eastern South Dakota.

Eleven Authorized Flood Prevention Watersheds. 1966. *USDA Soil Conservation Service SCS-CI-15.* Purpose, progress, area, cost, and completion dates given for the 11 watersheds authorized by the Flood Control Act of 1944 for watershed investigations and for planning and installing measures to reduce runoff and erosion and slow down streamflow. These watersheds cover 30 million acres.

Stream Quality in Appalachia as Related to Coal-Mine Drainage. 1965. BY J. E. BIESECKER AND J. R. GEORGE. *1966. U. S. Geol. Surv. Circ. 526. 27 pp., illus.; map in pocket.* Basic data of field determinations and laboratory analyses and summary of field reconnaissance that disclosed that 194 of 318 sampling sites were measurably influenced by mine drainage.

Restoration and Retention of Coastal Dunes with Fences and Vegetation. BY J. A. JAGSCHITZ AND R. S. BELL. *1966. Rhode Island Agr. Expt. Sta. Bul. 382. Kingston, R. I. 43 pp., illus.*

Federal Executive Policy Governing the Reporting of Recreation Use of Federal Recreation Areas. BY RECREATION ADVISORY COUNCIL. *1965. Circ. 6. 5 pp. $0.10.*

When Natural Disaster Strikes. *Revised 1966. USDA PA-533. 8-page foldout.* What the U.S. Department of Agriculture can do.

Guides to Outdoor Recreation Areas and Facilities. BY U.S. BUREAU OF OUTDOOR RECREATION. *1966. U.S. Department of Interior. 36 pp. 20¢.* A listing of lists.

American Beachgrass (Establishment, Fertilization, Seeding). BY J. A. JAGSCHITZ AND R. S. BELL. *Rhode Island Agr. Expt. Sta. Bul. 383. Kingston, R. I. 43 pp., illus.*

Surplus Cropland. *USDA PA-670. (12 pp., illus.).* The ACP story of "opportunity for increasing benefits through conservation action."

Soil Surveys

Dyer County, Tennessee. BY WILLIAM C. MOFFITT, CHARLES L. MOORE, AND WESLEY C. JACKSON. *1965. 79 pp., illus.; maps 4 inches to the mile (1:15,840).*

Reno County, Kans. BY JAMES J. ROCKERS, IVAN RATCLIFF, LOUIE W. DOWD, AND EDWARD F. BOUSE. *1966. 72 pp., illus.; maps 317 inches to the mile (1:20,000).*

Alfalfa Increases Intake Rates

A 6-year study of the effect of crop sequence and tillage practice on water intake rates in large plots in the High Plains of Texas indicate that 2 years of alfalfa increased intake rates on Pullman silty clay loam beginning 1 year after the alfalfa was plowed under. Intake rates increased for about 4 years then declined to those under continuous cropping. The highest rate was during the second year after the alfalfa was plowed under.

The study area is unique because most of the irrigated land is one soils series—Pullman. These soils represent more than 5 million acres of the "hardlands" in the Southern High Plains of Texas, New Mexico, and Oklahoma. ♦

From the Administrator:

Cooperation in Woodland Conservation

THE SOIL CONSERVATION SERVICE has a concern with conservation on woodlands, not as a separate activity served by a separate corps of technicians, but as a part of the total soil and water conservation program for any tract of privately owned land.

In speaking to the first Pan American Soil Conservation Congress in Brazil, Secretary of Agriculture Freeman said, "Soil conservation is not erosion control alone. It is a sophisticated combination of technologies fitted to the resources and the people involved.

"Land resources—soil, water, plants, and animals—cannot be effectively used or managed separately. They are completely interdependent. They must be treated as a whole."

Conservation is not the exclusive property of any single agency, individual, or group; it is the concern of all.

Within the Department of Agriculture each of several agencies is involved in one way or another with the conservation of the resources of the Nation. Nearly every department in our Government is also concerned with conservation.

Likewise, at the State and local levels, there are many groups and agencies, both public and private, that have a vital interest in the total conservation effort or with phases or facets of this total effort.

Conservation is complex. It includes many activities, applied to the various resources separately or in combination, to serve the differing interests of different people.

Conservation in its broadest sense can be defined as "wisely using the total human and natural resources of the Nation for the greatest good for the greatest number of people, now and for the future."

Within this concept there is one broad conservation program, having many phases and involving many sciences. As the agency designated by the Department of Agriculture to work cooperatively with soil and water conservation districts in providing technical leadership in soil and water conservation, the Soil Conservation Service administers one conservation program.

To be sure, the program has many phases, including soil surveys, watershed protection and development, snow surveys, conservation on cropland, woodland, rangeland, and others, all combining the many sciences into one soil and water conservation program.

The soil conservationists employed by SCS are general practitioners in the field of conservation. While their basic training may have been in one of several disciplines, they are given training and experience in the other sciences involved.

To keep abreast of today's rapid technological developments, the soil conservationist must be continually trained. For this purpose, SCS employs specialists in each of the disciplines involved. These specialists are experts in their fields of biology, agronomy, forestry, engineering, range, soils, economics, and the like.

With the constant backstopping from specialists, our soil conservationists are able to help landowners develop complete conservation programs for each acre of their operating units. They provide this type of service for all land, whether it is to be devoted to the production of forage crops, row crops, forest crops, or other uses.

The Soil Conservation Service does not, however, provide all the services and facilities that landowners as cooperators with districts need.

A basic conservation plan involving the establishment of woodland conservation practices may call for the services of a professional forester—one employed by the State, by industry, or a consulting forester—to help the landowner plan this phase of his conservation program in more detail and to apply it.

In all the phases of the total conservation program, there are needs for many facilities and many services. When such additional help is needed, the local soil and water conservation district organization is in a logical position to enter into a memorandum of agreement with other agencies and groups to make the services and facilities available.

For an effective program there must be cooperation at each step. The individual land owner or operator must work with his neighbors. He should be willing to help and to be helped in developing the conservation plan and program for his individual unit.

Individuals can work most effectively through organizations like conservation districts and watershed projects, where they can make coordinated use of the services of agencies designated to help with the total conservation program.

And the agencies and groups interested in conservation also need to work together to use their resources to help landowners carry out their conservation objectives.

Reasonable men can always find ways to cooperate on the basis of mutual interest in the kind of conservation program that will best serve the public interest.

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